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HERMETICALLY-SEALED CONTAINER  
AND CLOSURE CONSTRUCTION

**TECHNICAL FIELD**

5        This invention relates generally to containers for  
cosmetic substances and the like.

**BACKGROUND ART**

10        The invention relates more particularly to containers  
that are intended to provide an air-tight or hermetic  
seal between a container body and a lid or cover member  
therefor.

15        The following patents are cited as being of  
interest in the field to which the present invention  
pertains.

U. S. Patents Nos.:

3,117,691

3,149,747

5,139,165

20        Canadian Patent No. 2,047,926

British Patent No. 725,882

British Published Application No. GB 2 100 239A

Japanese Published Application No. 6-144453

European Published Application No. EP 478 848 A1

25        U. S. Patent No. 3,117,691 relates to a container  
in the form of a vial constituted of HDPE, having on  
its lip an annular groove (18) with an undercut or  
shoulder (13). The vial is fitted with a closure cap  
having an external bead with an undercut shoulder (14),  
30        and with a conical lead-in surface (19) on the shoulder  
so as to facilitate assembly of the cap. Forcible by-  
pass of the bead and shoulder effects a seating of the  
edge of the cap into the groove. Sealing is purportedly

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effected by the engagement of a corner of the bead (14) with a conical surface of the shoulder, as noted in col. 2, line 48 of the patent specification.

U. S. Patent No. 3,149,747 relates to a retainer  
5 construction for releasably joining plastic sheets, utilizing various types of tongue and groove formations, and wherein the respective tongue portions are provided with suitable enlargements or beads so as to enable a snap fit of the tongue portions into the respective  
10 groove portions. The use of different plastics is discussed, col. 3, beginning at line 15.

U. S. Patent No. 5,139,165 involves a container for storage and shipping of photographic film. Figs. 8(a) and 8(b) illustrate one embodiment wherein a lid  
15 (5) is provided with a downwardly facing peripheral groove having an undercut, and is receivable on the lip of a container. The lip in turn, has an enlargement or bead defining a cooperable undercut which can be received in the groove and brought into engagement with  
20 the surface of the undercut thereof. The resultant construction is alleged to have sealing characteristics, as noted in col. 3, line 54 of the patent specification.

Still other containers are shown in British Patent No. 725,882 and British Published Application No. GB 2  
25 100 239A.

British Patent No. 725,882 discloses a jar having a lip with an external bead, and a lid having a peripheral groove with an undercut. Assembly of the lid to the jar results in seating of the bead against the under-  
30 cut surface of the lid groove.

British Application No. GB 2 100 239A discloses a container construction utilizing a safety interlock connection effected by cooperable beads on the lid and on the outer wall of a groove of the container lip, the  
35 interlock purportedly minimizing the likelihood of the lid being dislodged as a result of internal pressure in

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the container. Forcible by-pass of the interlocking beads is required during both application and removal of the lid.

Canadian Patent No. 2,047,926 discloses a container/closure construction wherein the lip of the container is provided with an outwardly-facing retainer bead, and the closure lid has a depending skirt with an inwardly facing bead that can by-pass the lip bead when the closure is assembled. An inner depending skirt on the closure is telescopically received in the bore of the neck, to provide a seal of the container interior.

Japanese Published Application No. 6-144453 discloses a method of blow molding a container and simultaneously affixing it to an existing molded closure cap. In accomplishing this, the lip of the container is formed in and occupies a peripheral groove in the closure cap. The latter has various layers of resin incorporated therein, believed to isolate the molded cap from potentially damaging heat transfer that would otherwise occur from the contact of the cap by the molten plastic of the container.

European Published Application No. EP 478 848 A1 relates to a container and closure, wherein the closure and container neck have cooperable bead-and-groove formations which effect a retention of the closure on the container.

One of the problems in the molded plastic container art is that the material must be sufficiently rigid so as to retain the shape and strength of the individual parts, whereby inadvertent distortion of either the container itself or the cap, is minimized. The material must be of sufficient rigidity to avoid being crushed when packaged, and during shipping and storage. At the same time, where it is desired to rely upon a plastic-to-plastic seal between a container lip and a closure cap, some degree of deformation is necessary as a con-

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sequence of less than ideal tolerances in the dimensions of the container and cap. Prior efforts to achieve effective seals have, to a large extent, resulted in compromises in the choice of materials, and the particular  
5 molded structures utilized for engagement with one another.

In container constructions characterized by relatively large areas of engagement between a lip portion and a closure cap portion, it is generally recognized  
10 that gaps tend to develop between the mating surfaces, in spite of the best efforts to avoid them. Stated differently, the absolute contact pressure from one point in a large surface to an adjoining point or to a remote point, is not uniform, in practice. Instead, "high"  
15 spots tend to press against each other, and "low" spots tend to become separated from one another. This characteristic is particularly in evidence when sealing a hinged cosmetic compact where cooperating surfaces of the cover and base are held together tightly only at  
20 the hinge and clasp; other points of contact are free to gap or bow. It is considered very difficult from a practical standpoint, to reduce this tendency for high and low spots to occur. This is especially true with molded plastic products because of any unpredictable  
25 shrinkage which occurs as the plastic cures.

Also, in attempting to provide a rigid container structure, the plastic which is used often lacks the necessary resilience, thereby sacrificing the integrity of any seal that is sought. A rubber gasket is a good  
30 example of a resilient article which has the required elastic and memory characteristics to deform and compress as required, when sandwiched between two otherwise rigid components such as a glass jar and a metal lid. Rubber, however, is generally unsuitable as far as  
35 possible utilization in the fabrication of containers

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(compacts, jars) and closures of the type with which the present invention is concerned.

#### DISCLOSURE OF THE INVENTION

5       The above drawbacks and disadvantages of prior containers and closures are largely obviated by the present invention which has for one object the provision of a novel and improved hermetically sealable container and closure which are both simple in their structure and reliable and effective in use.

10       Another object of the invention is to provide an improved, hermetically sealable container and closure as above set forth, which can be readily fabricated in simple plastic molds, and at low cost.

15       Yet another object of the invention is to provide an improved, hermetically sealable container and closure in accordance with the foregoing, which is characterized by a unique line-of-contact type engagement between the sealing portion of a container and a closure, thereby providing peripheral pressures of a type necessary in order to insure the establishment of a continuous and uninterrupted air-tight or hermetic seal, while still utilizing plastic substances which have the required strength and rigidity characteristics to render them

20       useable for a wide variety of cosmetic products, including cosmetic compacts, lipsticks, and/or cases of various kinds utilized in color cosmetics, hair care formulations, health and beauty aids.

25       Still another object of the invention is to provide improved hermetically sealable packaging components as above characterized, which are highly resistant to inadvertent breakage, as from rough handling during storage or shipping, or during use by the consumer.

30       Yet another object of the invention is to provide improved hermetically sealable cosmetic components of the kinds indicated, which eliminate the need for spec-

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ial sealing gaskets or rings, thereby reducing the overall number of parts required and also eliminating unnecessary additional assembly operations.

The above objects are accomplished by a container and sealing closure therefor comprising in combination, a container body part having an access opening and a continuous peripheral wall surrounding the access opening, and wherein the wall has a peripherally extending continuous sealing edge portion which is coextensive with the remainder of the wall, and comprising a closure part having a resilient skirt portion. The sealing edge portion of the peripheral wall comprises a sharp apex forming an included angle of substantially 90 degrees. The skirt portion of the closure is adapted to mate in spaced relation with the peripheral wall of the container part, and the skirt portion has an inner surface which extends obliquely with respect to the peripheral wall of the body part and which is adapted to engage the apex. There are provided coengaging means on the container and closure parts, holding the resilient skirt portion of the closure part forcibly against the apex as the closure part is advanced against the container body part, to close the same.

The arrangement is such that a highly effective seal is accomplished owing to the limited area of contact between the edge portion of the wall of the body part and the oblique surface of the skirt of the closure part, in a preferred embodiment.

### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, illustrating various embodiments of the invention:

Figure 1 is a side view, partly in elevation and partly in axial section, of a container construction and closure therefor, fabricated in accordance with the principles of the present invention.

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Fig. 2 is a view like Fig. 1, of a somewhat modified container and closure, constituting another embodiment of the invention.

5 Fig. 3 is a front view, partly in elevation and partly in axial section, of a cylindrical lipstick case constructed in accordance with the principles of the present invention and as shown in Fig. 1.

Fig. 4 is a top plan view of the lipstick case of Fig. 3.

10 Fig. 5 is a bottom plan view of the lipstick case of Figs. 3 and 4.

Fig. 6 is a view like Fig. 3, of a modified lipstick case utilizing the construction of Fig. 2, wherein the cross sectional configuration is a polygon, constituting still another embodiment of the invention.

15 Fig. 7 is a top plan view of the lipstick case of Fig. 6.

Fig. 8 is a bottom plan view of the lipstick case of Figs. 6 and 7.

20 Fig. 9 is a view like Fig. 3, of a further modified lipstick case wherein the cross sectional configuration is generally square, with rounded corners, constituting yet another embodiment of the invention.

25 Fig. 10 is a top plan view of the lipstick case of Fig. 9.

Fig. 11 is a bottom plan view of the lipstick case of Figs. 9 and 10.

30 Fig. 12 is an axial section, enlarged, of a cosmetic compact constructed in accordance with the principles of the present invention, shown in an open position, constituting yet another embodiment of the invention.

35 Fig. 13 is an axial section of the cosmetic compact of Fig. 12, showing the cosmetic compact in a closed, sealing position.

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Fig. 14 is a fragmentary axial section, greatly enlarged, of a portion of the container rim and lid of the cosmetic compact of Figs. 12 and 13.

Fig. 15 is a top plan view of a further modified cosmetic compact, constituting still another embodiment of the invention.

Fig. 16 is a transverse axial section of the compact of Fig. 15.

Fig. 17 is a transverse axial section of the compact of Figs. 15 and 16, taken at 90 degrees with respect to the section of Fig. 16, and showing in dotted outline, a recess constituting a finger-engageable lifting edge construction for opening the compact.

Fig. 18 is a view similar to Fig. 16, enlarged, showing the compact partially opened, and revealing a finger-engageable lifting edge construction.

Fig. 19 is a view like Fig. 1, of a further modified container construction and closure therefor, constituting another embodiment of the invention.

Fig. 20 is a view like Fig. 19, of a still further modified container and closure, constituting still another embodiment of the invention.

Fig. 21 is a view like Fig. 19, of yet a further modified container and closure, constituting yet another embodiment of the invention.

Fig. 22 is a view like Fig. 19, of still a further modified container and closure, constituting yet another embodiment of the invention.

Fig. 23 is a view like Fig. 19, of a still further modified container and closure, constituting another embodiment of the invention.

Fig. 24 is a view like Fig. 19, of yet a further modified container and closure, constituting still another embodiment of the invention, and

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Fig. 25 is a view like Fig. 19, of a still further modified container and closure, constituting yet another embodiment of the invention.

5

#### MODE FOR CARRYING OUT THE INVENTION

Referring first to Fig. 1 there is illustrated an improved container and sealing closure therefor, the container being designated generally by the numeral 10, and the closure being indicated at 12. The container comprises a body part 14 having a mouth or access opening 16 which is surrounded by a continuous peripheral wall 18. The closure comprises a closure part 20.

In accordance with the present invention there is provided on the container body part 14 and closure or closure cap part 20, a novel sealing mechanism which relies essentially on a relatively high, linear or line-like pressure track or area that is established by a sharp, substantially 90 degree apex or corner configuration on one of either the closure part 20 or container body part 14, and a cooperable tapered surface on the other of either the closure part 20 or container body part 14, and wherein the engagement is maintained by coengaging means on the container body part and closure part, which operate to force the sharp apex into sealing engagement with the tapered surface whenever the closure part is being seated on the container body part.

In accomplishing the improved seal, the peripheral wall 18 of the container body part 14 has a continuous sealing edge portion comprising an apex 22 that is disposed at the junction of a ledge 24 and a broader side surface 26 of the peripheral wall 18, such ledge 24 and

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side surface 26 defining an included angle of substantially 90 degrees. Other side surfaces of the wall 18 are designated 28, 30 and 32, respectively.

Referring again to Fig. 1, in accomplishing the seal, the closure part 20 is provided with a depending resilient skirt portion 34 that has a tapered inner surface 36 which extends obliquely with respect to the surface 26 of the peripheral wall 18 of the container body part 14 and is adapted to engage the sealing edge or apex 22 thereof. The arrangement is such that the ledge 24 and surface 26 which form the included angle at the apex 22 are both oblique to the inner surface 36 of the skirt portion 34, with the apex 22 bearing against the surface 36 at a single line-like path or track thereon when the closure part 20 is seated as in Fig. 1.

The coengaging means that forces the skirt portion 34 against the apex 22 can, in a preferred embodiment, comprise the surface 30 of the peripheral wall 18 on the container body part 14. In effect, the surfaces 26 and 30 define an annular groove or well 38 that receives the depending skirt portion 34 of the closure part 20.

In Fig. 1, the skirt portion 34 preferably has an external bead 40, and the surface 30 has an undercut 42. During application of the closure part 20 to the body part 14, the bead 40 is forced into the groove 38 and seats in the undercut 42. Fig. 1 shows the groove, and diagrammatically illustrates the resilient engagement of the bead 40 with the wall of the undercut 42. Where either the bead 40 or the surface of the undercut 42 is resilient, momentary yielding of one or both parts occurs, and the resiliency biases the skirt portion 34 radially inwardly after seating, forcing the tapered surface 36 into biting engagement with the sharp edge or apex 22.

In practice and as can be seen in Fig. 1, the spacing between the portion 44 of the surface 36 which lies

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above the apex 22 and the adjacent surface 26 is non-uniform, being greater immediately adjacent the apex 22, and less as the distance from the apex increases, measured axially of the container body part 14.

5 Also, preferably the spacing between the portion 46 of the surface 36 which lies below the apex 22 and the adjacent surface 26 is non-uniform, being smaller immediately adjacent the apex 22, and greater as the distance from the apex increases, measured axially of  
10 the container body part. The surfaces 44 and 46 are shown as being non-cylindrical.

The above construction has the following important advantages. Due to the absence of broad sealing surfaces, as is characteristic of many of the devices of the prior  
15 art, by the present invention the contact between the closure part 20 and container body part 14 occurs essentially along a linear track at the apex 22. Since pressure is calculated to be force per unit area, where a line contact exists the area is a small number, and the  
20 resultant contact pressure which exists is relatively high. As presently understood, the high pressure which is established between the engaging surfaces is a significant factor in the attainment of an effective airtight seal, in accordance with the present invention.  
25 Such cooperation is free from even slight undulations and aberrations normally present among planar surfaces.

In contrast, many sealing arrangements of the prior art which involve broad surfaces that engage one another, do not enjoy high contact pressures similar to that  
30 described in connection with the present invention. In the case of large surface areas which are in contact with one another, the total force existing between two sealing members is spread over a correspondingly large area. Accordingly, such large areas of engagement give  
35 rise to low-pressure contacts, measured in terms of

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pressure units, such as  $\text{g/m}^2$ , and so forth. The present invention is seen to largely overcome the undesirable effects of a poor seal arising from the engagement of large surface areas on the components making up the seal.

A further feature of the present invention resides in the fact that with the disclosed structure, reliance is placed on essentially radially extending forces between the closure part 20 and container body part 14, as opposed to axial pressures as was the case with many of the prior art constructions. For example, in the prior art, where a continuous thread cap is utilized to apply an axially downward pressure on a gasket carried thereby and against the lip of the container body part, slight misalignments or warping tend to give rise to poor seals. In addition, certain resilient gaskets take a set and experience "creep" after a period of compression, and thus lose some of their resiliency.

In contrast, by the present invention, no utilization of gaskets per se is made, and the forces which exist between the apex 22 and the skirt portion surface 36 are almost exclusively radial in direction. Such an arrangement is considered to facilitate installation and removal of the closure part 20 from the container body part 14.

Another embodiment of the invention is shown in Fig. 2, illustrating a modified container and closure construction. The container comprises a body part 52 having a mouth 54 and a continuous peripheral wall 56. The closure part is indicated at 58.

By the invention, the peripheral wall 56 of the container body part 52 has a sealing edge portion comprising an apex 60 that is disposed at the junction of a ledge and a broader side surface of the peripheral wall, similar in construction to the arrangement of Fig. 1.

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The closure part 58 has a depending resilient skirt portion 62 that has a tapered inner surface 63 which is adapted to engage the sealing edge or apex 60. The arrangement is such that there is formed an included  
5 angle of 90 degrees at the apex 60, and the latter tends to bite into the surface 63 at a single linear path or track thereon when the closure part 58 is seated as in Fig. 2.

Coengaging means forcing the skirt portion 62  
10 against the apex 60 can comprise an undercut 66 on the surface of the peripheral wall 56 of the container body part 52, and a bead 68 on the skirt portion 62. During installation, the bead 68 seats in the undercut 66.

Further, by the invention, in Fig. 2 the container  
15 body part 52 is provided with an external, upwardly facing ledge 70, and the closure part comprises an outer depending skirt 72, adapted to be received on the ledge 70, and to butt against the upwardly facing surface thereof. With such a construction, an improved wedging  
20 action occurs between the bead 68 of the skirt portion 62 and the surface of the undercut 66, since the latter is in effect, captive in a downwardly facing trough of the closure part 58, and additional plastic material surrounds and thus backs up the surface of the trough.  
25 Less yielding of the wall of the container body part 52 will occur, and consequently the retentive force on the closure part 58 can be increased by utilization of the structure shown in this figure.

In addition, from the aesthetic standpoint, the  
30 construction of Fig. 2 is advantageous in that it conceals the joint between the skirt portion 62 and wall 56, which would otherwise be visible as in the construction of Fig. 1. In other respects the embodiment of Fig. 2 is similar to that of Fig. 1.

35 The present invention has particular application in the field of cosmetics, and is especially adaptable

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for incorporation in lipstick cases or cosmetic compacts.

Specific cosmetic applications of the novel containers and sealing closures of the present invention are illustrated respectively in Figs. 3-5; 6-8; and 9-11.

Figs. 3-5 illustrate a lipstick case 80, comprising a base 82 and cover 84, and molded stick product 86 carried in the base 82. By the present invention, the base 82 and cover 84 are provided with the novel sealing mechanism described in connection with the embodiment of Fig. 1. In particular, the sealing mechanism between the lipstick base 82 and cover 84 relies essentially on the relatively high, linear or line-like pressure track that exists between the 90 degree corner configuration on the base at the apex 22 in Fig. 1, and the cooperable tapered inner surface 36 in Fig. 1. The engagement is maintained by coengaging means on the base and cover, corresponding to parts 40 and 42 of Fig. 1, which operate to force the apex 22 into sealing engagement with the tapered surface 36 whenever the cover is assembled to the base.

The lipstick case of Figs. 3-5 has a substantially round cross sectional configuration, as illustrated in Figs. 4 and 5.

Figs. 6-8 illustrate the sealing mechanism of the invention as applied to a lipstick case of hexagonal cross sectional configuration, comprising a base 90 and a cover 92, and wherein the cover 92 is provided with an external, peripheral depending skirt portion 94 which surrounds the area of the seal, and provides a smooth interface between the base 90 and cover 92. A sealing construction corresponding to that of Fig. 2 is utilized in the device of Figs. 6-8.

Similarly, Figs. 9-11 show still another embodiment, wherein the sealing mechanism of the invention is



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applied to a lipstick case 106 of generally square cross sectional configuration, with the corners of the square being rounded mainly for aesthetic reasons. A peripheral skirt 108 is provided, as in Fig. 2, to present a smooth transition between the base and cover.

A further embodiment of the invention is shown in Figs. 12-14, illustrating a cosmetic compact generally designated by the numeral 114. The compact 114 comprises a base member or container body part 116, and a hinged closure part 118 which may be integrally molded with the base member 116. A dead-center, snap-action hinge 120 may be incorporated in the compact, the details of which are, per se, known in the art.

In the present instance, the container body part 116 comprises a cup 122 which telescopically fits into a shell portion 124 of the base 116, the cup 122 having an upwardly facing groove 126 that is similar in construction to groove 38 of Fig. 1, as to its contour. The closure part 118 comprises a peripheral ring member 128 and as a separate insert, a lens member 130, which may be transparent or semi-transparent. By the present invention, the wall of the cup 122 has a continuous sealing edge or apex 132 that forms a sharp corner similar to that indicated 22 in Fig. 1. The lens member 130 is provided with a depending resilient skirt portion 134 that has a tapered inner surface 136 which is adapted to engage the sealing edge or apex 132. The arrangement is such that the faces which form the apex 132 are both oblique to the inner surface 136 of the skirt portion 134, with the apex bearing against this surface at a single linear path or track thereon when the closure part 118 is seated.

As in the previous embodiments, coengaging means force the skirt portion 134 against the apex 132, the coengaging means comprising an undercut surface 140 on the cup 122, and a bead 142 on the skirt portion 134.

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The bead 142 is received in the undercut surface 140 in order to effect the desired retention.

In practice, the lens member 130 is held in place by a peripheral flange 146 on the ring member 132, and  
5 a tongue and groove formation on the lens member 130 per se and the inner wall of the ring member 128, as in Fig. 14. Optionally, a finger-engageable lifting edge (not shown) is provided, to facilitate opening of the compact.

10 Still another embodiment of the invention is shown in Figs. 15-18, illustrating the sealing mechanism of the invention as applied to a modified cosmetic compact 160 having a conventional hinge 162. The compact is characterized by a body part or base 164 and a closure  
15 part 166, with the base 164 having a peripheral wall portion 168 with a continuous sealing edge or apex 169. A second wall portion 170 surrounds the first, forming an upwardly facing groove 172. By the invention the sealing edge or apex 169 is formed by divergent surfaces  
20 disposed at an included angle on the order of 90 degrees. The closure part 166 has a resilient skirt portion 176 which is received in the groove 172 in the base 164, and the skirt portion 176 has an inner surface 178 which extends obliquely with respect to the peripheral wall  
25 portion 168 of the base and is adapted to engage the sealing edge or apex 169. In the present instance, the sharp corner or apex 169 is disposed at the lip of the base, particularly the innermost edge thereof.

In effecting the seal, the tapered surface 178 of  
30 the skirt portion 176 is engaged by the sharp, 90 degree apex 169, with the latter in effect, bearing against the tapered surface 178 along a series of joined line segments which follow the generally rectangular contour of the compact 160. As in the previous embodiments,  
35 there is achieved a high-pressure contact as a consequence of the limited area of engagement between the

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apex or edge 169 and the tapered surface 178. In practice, the skirt portion 176 wedges into the groove 172 and is frictionally held therein. Internal bead 182 on the closure part 166 along with an external bead 184 on the base, can optionally be provided, to retain the closure part in its closed, sealing position. A finger-engageable lifting edge 186 is also provided, opposite the hinge 162, so as to facilitate opening of the compact.

Fig. 18 shows a cross section of the compact in a partially open condition, wherein the tapered sealing surface 178 has left the groove 172 of the base 164, and the compact is about to be opened for accessing the applicator (not shown) and cosmetic material (not shown) carried in the compartments of the base.

Another embodiment of the invention is illustrated in Fig. 19, showing a container body part 190 and closure part 192, and which utilizes a sealing structure comprising an apex designated 194 on the body part, and a depending skirt portion 196 on the closure part 192. The body part has a peripheral wall with facing concentric surfaces 198 and 200, defining a groove 202. The skirt portion 196 has a tapered inner surface 204, adapted to be forcibly engaged by the apex 194 when the closure part 192 is seated on the container body part 190. In contrast to the embodiment of Fig. 1, the embodiment of Fig. 19 omits the bead and undercut arrangement corresponding to the numerals 40 and 42 of Fig. 1, and instead relies on a frictional engagement between the surfaces 200 and 206, and in addition, the resilience of the container body part 190, which squeezes or wedges the skirt portion 196, and forces the tapered inner surface 204 thereof into engagement with the apex 194.

Fig. 20 illustrates yet another embodiment, showing a container body part 210 and closure part 212, and which utilizes a sealing structure comprising an apex

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designated 214 on the peripheral wall of the body part 210, and a depending skirt portion 218 on the closure part 212. The container body part 210 has facing concentric surfaces 220 and 222 of a groove 224. By the invention, the skirt portion 218 has a tapered inner surface 226, which is forcibly engaged by the apex 214 when the closure part 212 is seated on the container body part 210. Also, by the invention, in Fig. 20 the surface 227 is bowed or otherwise curved in cross-section, and the lower edge of the skirt portion 218 is provided with a supplemental sealing edge 228, for intimate engagement with the surface 220 of the groove 224. With such an arrangement, a secondary seal is established between the edge 228 and surface 220, this latter seal being disposed deep in the groove 224.

In Fig. 21 there is shown a further embodiment in which there are provided a container body part 232 and closure part 234, and a sealing structure comprising an apex on the body part 232, and a depending skirt portion 233 on the closure part 234. The body part 232 has a peripheral wall containing the apex 238, with adjoining concentric surfaces 240 and 242, defining a groove 244. As in the previous embodiment, the skirt portion 233 has a tapered inner surface 246, adapted to be forcefully engaged by the apex 238 when the closure part 234 is seated on the container body part 232. By the invention, there is provided an annular surface 248 at the bottom of the groove 244, and the skirt portion 233 terminates in a taper or bevel portion having a sharp edge 252, which latter forms a supplementary seal with the surface 248 when the closure part 234 is seated on the container body part 232.

Still other embodiments are illustrated in Figs. 22-25, respectively. In Fig. 22, there is illustrated a container body part 256 and closure part 258, and a sealing structure comprising an apex on the body part,

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and a depending skirt portion 260 on the closure part 258. The body part 256 has a peripheral wall containing the apex 264, with adjoining concentric surfaces 266 and 268 of a groove 270. The skirt portion 260 has a tapered inner surface 272, adapted to be forcefully engaged by the apex 264 when the closure part 258 is seated on the container body part 256. By the present invention, the bottom of the groove 270 is provided with an upstanding annular bead 274, which engages the lip of the skirt portion 260 and establishes a secondary seal. This may be of significant importance particularly in the case where the plastic material of either the container body part 256 or the closure part 258 is resilient. The primary seal is established by the engagement of the tapered surface 272 with the apex 264 of the wall of the container body part 256 as in the previous embodiments.

Fig. 23 shows a further modification, involving a container body part 280 and closure part 282, and a sealing structure comprising an apex on the body part 280, and a depending skirt portion 284 on the closure part 282. The body part 280 has a peripheral wall which contains the apex 288, with adjoining concentric surfaces 300 and 302 of a groove 304. The skirt portion 284 has a tapered inner surface 306, adapted to be forcefully engaged by the apex 288 when the closure part 282 is seated on the container body part 280. By the invention there is provided an external retention bead 308 at the bottom edge of the skirt portion 284, which is receivable in an undercut 310 of the groove 304 of the container body part 280. The bead 308 and undercut 310 thus form a snap-lock, which normally retains the closure part 282 in assembled relation on the container body part 280, but the bead can forcibly by-pass the undercut during removal of the closure part 282. In this connection, the degree of overlap of the

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bead 308 and wall of the undercut 310 is such as to provide adequate retention during storage or shipping of the product, while enabling the closure part 282 to be readily removed upon the user applying a reasonable force thereto.

Fig. 24 illustrates still another embodiment of the invention. As in the immediately preceding embodiment, there are provided a container body part 314 and closure part 316, and a sealing structure comprising an apex on the body part 314, and a depending skirt portion 318 on the closure part 316. The body part 314 has a peripheral wall containing the apex 321, with adjoining concentric surfaces 322 and 324 of a groove 326. The skirt portion 318 has a tapered inner surface 328, adapted to be forcefully engaged by the apex 321 as the closure part 316 is seated on the container body part 314. In the present embodiment, the one surface 324 of the groove 326 is provided with an annular ledge 330, and the outer surface of the skirt portion is tapered, at 332. A secondary seal similar to that of the primary seal is thus realized, with the resilience of the skirt portion 318 and the surfaces 328, 332 maintaining a wedging relationship that effects a simultaneous forceful engagement between the apex 321 and surface 328, and the corner of the ledge 330 and surface 332.

Fig. 25 illustrates still another embodiment of the invention, comprising a container body part 336 and closure part 338, the container body part 336 being provided with an upstanding skirt portion 340, and the closure part having a downwardly facing groove 342. By the invention, the seal is established between an apex 344 in this figure, and a tapered surface 346 of the upstanding skirt portion 340. The latter has an undercut 348 which cooperates with a similar undercut in the groove 342, to maintain the closure part 338 in a normally closed condition. The retention characteristics are

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similar to those of the construction of Fig. 23. With the arrangement of Fig. 25, a shortened skirt portion 340 is featured, with the accompanying advantage of a more aesthetic appearance. This is important from the marketing standpoint, as in the case of a cosmetic product where the skirt portion might be so disposed as to encircle a mirror or a powder compartment, for example. Also, with the downwardly facing groove 342 being provided in closure part 338 as opposed to being on the container body part 336, there is had the further advantage that any tendency for cosmetic product to collect in the groove is eliminated, because the groove faces downwardly, as opposed to the prior constructions wherein an upwardly facing groove was utilized.

From the above it can be seen that we have provided novel and improved containers for cosmetic products, especially adapted for use with lipsticks, compacts, or other consumer-oriented cosmetic articles. The seal provided is as presently understood, more reliable than was the case in the container art as previously known or proposed. For the most part, little reliance is placed on axial forces between a cover and container, in effecting the seal. Instead, lateral forces between the side wall of a container and a corresponding skirt portion of a cover are utilized, in a novel wedging action that results in a forceful engagement between a sharp corner configuration on one component, and a tapered sealing surface on the other, which latter undergoes slight deformation to an extent depending on the relative resiliency of the materials used, and also upon the relative hardness of the materials. Depending on the resiliency of the mating surfaces, one surface can be thought of as biting against the other.

In preferred embodiments, components of equal hardness and resiliency can be utilized. Alternately, within the scope of the invention, either the apex or the

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tapered surface can have a greater hardness than that of the other, in order to meet the requirements of a particular application, and depending on the nature of the closing action involved, i. e. a hinged connection  
5 vs. a straight-application of a cover to a container, as in the case of a lipstick.

The disclosed constructions are thus seen to represent a distinct advance and improvement in the field of cosmetic dispensers.

10 Variations and modifications are possible without departing from the spirit of the invention.

Each and every one of the appended claims defines an aspect of the invention which is separate and distinct from all others, and accordingly it is intended  
15 that each claim be treated in this manner when examined in the light of the prior art devices in any determination of novelty or validity.



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What is claimed is:

1. A container and sealing closure therefor comprising, in combination:

5 a container body part having an access opening and a continuous peripheral wall surrounding said access opening, said wall having a peripherally extending continuous sealing edge portion which is coextensive with the remainder of the wall,

10 said sealing edge portion comprising a sharp apex forming an included angle of substantially 90 degrees,

a closure part having a resilient skirt portion with an inner surface adapted to mate in spaced relation with the peripheral wall of the container part, said inner surface extending obliquely with respect to  
15 the peripheral wall of the body part and being adapted to engage the apex of the said sealing edge portion, and

coengaging means on said container and closure parts, holding said resilient skirt portion of the  
20 closure part forcibly against said apex as the closure part is advanced against the container body part to close the same.

2. A container and sealing closure therefor in accordance with claim 1, wherein the continuous peripheral wall of the body part has a pair of concentric  
25 side surfaces.

3. A container and sealing closure therefor in accordance with claim 1, wherein the said sealing edge portion of the peripheral wall comprises an outwardly  
30 facing side surface thereof.

4. A container and sealing closure therefor in accordance with claim 1, wherein the coengaging means comprises a sloped face of the resilient skirt portion, and a cooperable side surface of the said continuous  
35 peripheral wall of the container body part.

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5. A container and sealing closure therefor in accordance with claim 2, wherein the said sealing edge portion of the peripheral wall comprises one of said side surfaces of the wall.

5 6. A container and sealing closure therefor in accordance with claim 1, wherein said sealing edge portion comprises the top rim part of the peripheral wall of the container body part.

7. A container and sealing closure therefor in accordance with claim 6, wherein:  
10 the continuous peripheral wall of the body part has a pair of concentric side surfaces,  
the said sealing edge portion of the wall is on one side surface thereof.

15 8. A container and sealing closure therefor in accordance with claim 1, wherein the sealing edge portion of the wall comprises a ledge thereon.

9. A container and sealing closure therefor in accordance with claim 1, wherein:  
20 the coengaging means comprises a portion of the peripheral wall of the container body part, spaced outwardly from another portion of the peripheral wall thereof,

said resilient skirt portion occupying the space  
25 between the said peripheral wall portions.

10. A container and sealing closure therefor in accordance with claim 9, wherein the closure part has an outer depending skirt, surrounding and spaced from the said resilient skirt portion thereof.

30 11. A container and sealing closure therefor in accordance with claim 1, wherein the coengaging means includes a tapered portion of said resilient skirt portion.

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12. A container and sealing closure therefor in accordance with claim 1, wherein the container body part and the closure part are hingedly connected together and comprise a cosmetic compact.

5 13. A container and sealing closure therefor in accordance with claim 1, wherein the container body part and the closure part comprise a lipstick case.

14. A container and sealing closure therefor in accordance with claim 1, wherein:

10 said container body part comprises a cosmetic compact base portion and a product-receiving cup telescopically received therein,

said closure part comprising a cosmetic compact cover,

15 said product-receiving cup having said sharp apex, and said closure part having said resilient skirt portion.

15. A container and sealing closure therefor in accordance with claim 1, wherein:

20 said container body part comprises a cosmetic compact base portion,

said closure part comprising a cosmetic compact cover having a peripheral annular component and a central viewing lens component secured thereto,

25 said resilient skirt portion being disposed on solely said lens component.

16. A container and sealing closure therefor in accordance with claim 15, wherein said lens component is telescopically fitted into said peripheral annular component, and wherein all portions of said peripheral component are disposed radially outside of said resilient skirt portion.

17. A container and sealing closure therefor in accordance with claim 1, wherein:

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said container body part comprises a cosmetic compact base portion, and

said closure part comprising a cosmetic compact cover,

- 5        said base portion and cover utilizing a hinge, and  
said base portion and cover being either molded integrally with one another and a living hinge, or separately with a mechanical hinge.

18. A container and sealing closure therefor in  
10 accordance with claim 1, wherein:

said container body part comprises a cosmetic compact base portion, and

said closure part comprising a cosmetic compact cover,

- 15        said base portion and cover being connected by a  
mechanical hinge, for enabling pivotal movement with respect to one another.

19. A molded plastic container for cosmetics, and  
a molded plastic, press-fit sealing closure therefor,  
20 comprising in combination:

- a container body part having a storage space that opens to an access opening which is commensurate in size with the span of said space, said body part having a continuous thin peripheral wall surrounding said access  
25 opening and said wall having a peripherally extending continuous sealing edge portion located on one surface thereof, said sealing edge portion being integral and coextensive with said wall,

- said sealing edge portion comprising a sharp apex  
30 forming an included angle of substantially 90 degrees,

- a closure part having a resilient skirt portion comprising an inner surface adapted to mate in spaced relation with one surface of the continuous peripheral wall of the container body part, said inner surface at  
35 most points being spaced from and oblique with respect

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to the thin peripheral wall of the body part and being adapted at other points to engage with a continuous line contact, the apex of the said sealing edge portion, and

5 coengaging wedging detent means on said container and closure parts, said wedging and detent means holding said resilient skirt portion of the closure part forcibly against the said apex of the sealing edge portion of the container body part as the closure part is  
10 advanced against the container body part with a press fit, to close the same,

said coengaging wedging detent means being opposed by the forcible engagement of the resilient skirt portion with the said apex of the sealing edge portion,

15 said coengaging wedging detent means having cooperable continuous friction surfaces which are forced past each other during the said engagement of the apex, one of said friction surfaces being resilient and deformable.

20 20. A container and sealing closure therefor in accordance with claim 19, wherein the spacing between the surface of the resilient skirt portion which lies above the apex and the adjacent surface of the peripheral wall is non-uniform, being greater immediately  
25 adjacent the apex, and less as the distance from the apex increases, measured axially of the container.

21. A container and sealing closure therefor in accordance with claim 19, wherein the spacing between the surface of the resilient skirt portion which lies  
30 below the apex and the adjacent surface of the peripheral wall is non-uniform, being smaller immediately adjacent the apex, and greater as the distance from the apex increases, measured axially of the container.

22. A sealable container construction and closure  
35 therefor, comprising in combination:

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a container body part and a closure cap part,  
one of said parts having a peripheral groove with  
oppositely facing resilient wall portions,

one of said wall portions comprising a projecting  
5 bead forming an undercut configuration,

the other of said wall portions comprising a  
stepped shoulder presenting substantially a 90 degree,  
sharp corner configuration,

the other of said parts comprising a resilient  
10 skirt portion having at one side, a projecting bead  
forming an undercut configuration, said projecting bead  
of the said one wall portion being receivable in the  
undercut configuration of the skirt portion of the  
other of said parts, so as to engage the undercut con-  
15 figuration and thereby retain the parts in assembled  
relation by means of a snap fit,

said skirt portion having at its other side, a  
frusto-conical surface, said frusto-conical surface  
having an upper portion and a lower portion,

20 said stepped shoulder being urged into forcible,  
intimate engagement with the frusto-conical surface of  
said skirt portion by the resilient engagement of the  
projecting bead of said one wall portion and the under-  
cut configuration, said intimate engagement occurring  
25 at substantially continuous linear contact located mid-  
way between the upper portion and the lower portion of  
said frusto-conical surface, so as to form a concen-  
trated line of sealing contact at said stepped shoulder  
and said frusto-conical surface.

30 23. A sealable container construction and closure  
therefor as set forth in claim 22, wherein the engage-  
ment of said stepped shoulder with said frusto-conical  
surface causes deformation of the latter and penetra-  
tion into the surface thereof.

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24. A sealable container construction and closure therefor in accordance with claim 22, wherein said peripheral groove has a bottom wall portion, and the skirt portion extends into the groove only to an extent  
5 wherein the lower edge of the skirt portion is spaced above the bottom wall portion such that the groove can accommodate either greater or lesser degrees of advancement of the skirt portion therein.

25. A sealable container construction and closure  
10 therefor in accordance with claim 22, wherein:  
said closure part has said peripheral groove, which faces in a downward direction when the container and closure are held in an upright position, and  
said container body part having said resilient  
15 skirt portion which is received in said groove when the closure is assembled to the container.

26. A sealable container construction and closure therefor in accordance with claim 25, wherein:  
said groove has an undercut configuration in one  
20 of its wall portions, and  
the edge of the skirt portion has an annular bead which releasably engages the surface of the undercut configuration of the groove when the closure is assembled to the container.

25 27. A container and sealing closure therefor comprising, in combination:  
a container body part having an access opening and a continuous peripheral wall surrounding said body part, said wall having a peripherally extending continuous  
30 sealing ledge which projects from its surface and which is coextensive with the wall,  
said sealing ledge having a sharp apex portion which separates it into divergently-facing surfaces, one of which forms substantially a 90 degree angle with  
35 the wall surface,

- 30 -

a cover part having a resilient skirt portion adapted to mate with the peripheral wall of the container part and engage the said sealing ledge thereof, and coengaging means on said container and cover parts, forcing said sealing ledge partially into said resilient skirt portion of the cover part as the latter is advanced against the container part to close the same.

28. A sealable container construction and closure therefor, comprising in combination:

10 a container body part and a closure cap part,  
one of said parts having a peripheral groove with oppositely facing resilient wall portions,  
one of said wall portions comprising a stepped shoulder presenting substantially a sharp, 90 degree  
15 apex,

the other of said parts comprising a resilient skirt portion having an inner surface of substantially frusto-conical configuration,

said sharp, 90 degree apex being urged into forcible engagement with the frusto-conical surface of said skirt portion by the resilient engagement of the skirt portion with the other of the oppositely facing resilient groove wall portions, said forcible engagement occurring at substantially continuous linear contact  
20 located midway between the upper portion and the lower portion of said frusto-conical surface, so as to form an air-tight seal between said apex and said frusto-conical surface.

29. A sealable container construction and closure  
30 therefor in accordance with claim 28, wherein the other of said wall portions of said groove has a peripheral relieved area whereby it engages the skirt portion at axially spaced lines of contact when the closure cap part is assembled to the container body part.



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30. A sealable container construction and closure therefor in accordance with claim 28, wherein:

said groove has a bevel adjacent to its bottom wall, and

5 the lower edge of the skirt portion has at its outermost surface, a taper terminating in a sharp edge which resiliently engages the bevel in the groove.

31. A sealable container construction and closure therefor in accordance with claim 28, wherein:

10 said groove has a raised track in its bottom wall, and

the lower edge of the skirt portion resiliently engages the raised track of the bottom wall of the groove when the closure is assembled to said container.

15 32. A sealable container construction and closure therefor in accordance with claim 28, wherein:

said groove has an undercut configuration adjacent its bottom wall, and

20 the lower edge of the skirt portion has an annular bead which releasably engages the wall of the undercut configuration of the groove.

33. A sealable container construction and closure therefor in accordance with claim 28, wherein:

25 said groove has a second apex adjacent its bottom wall, and

the lowermost edge of the skirt portion has a frusto-conical surface which sealingly engages the apex of the groove when the closure is assembled to said container.

30 34. A container and sealing closure construction comprising, in combination:

a container body part having an access opening and a continuous peripheral wall surrounding said access opening, said wall having a peripherally extending con-

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tinuous edge sealing portion which is coextensive with the remainder of the wall,

a closure part having a peripherally extending sealing portion adapted to mate in spaced relation with  
5 said peripherally extending edge sealing portion of the container part, one of said sealing portions extending obliquely with respect to the other of said sealing portions,

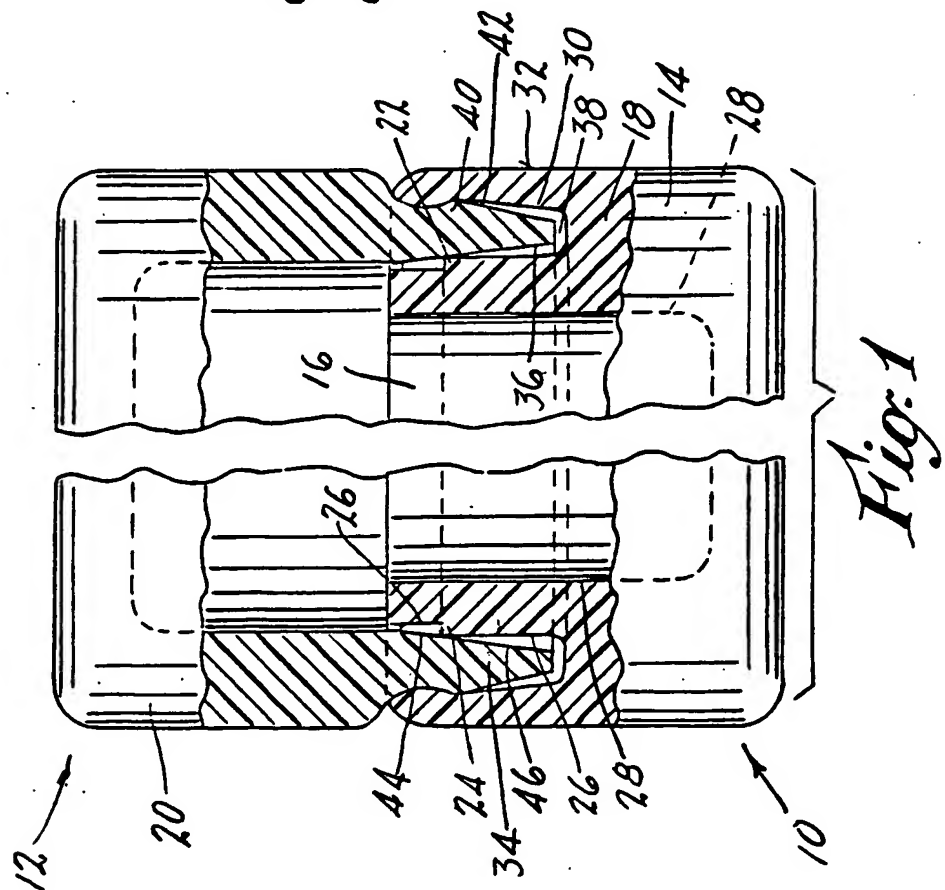
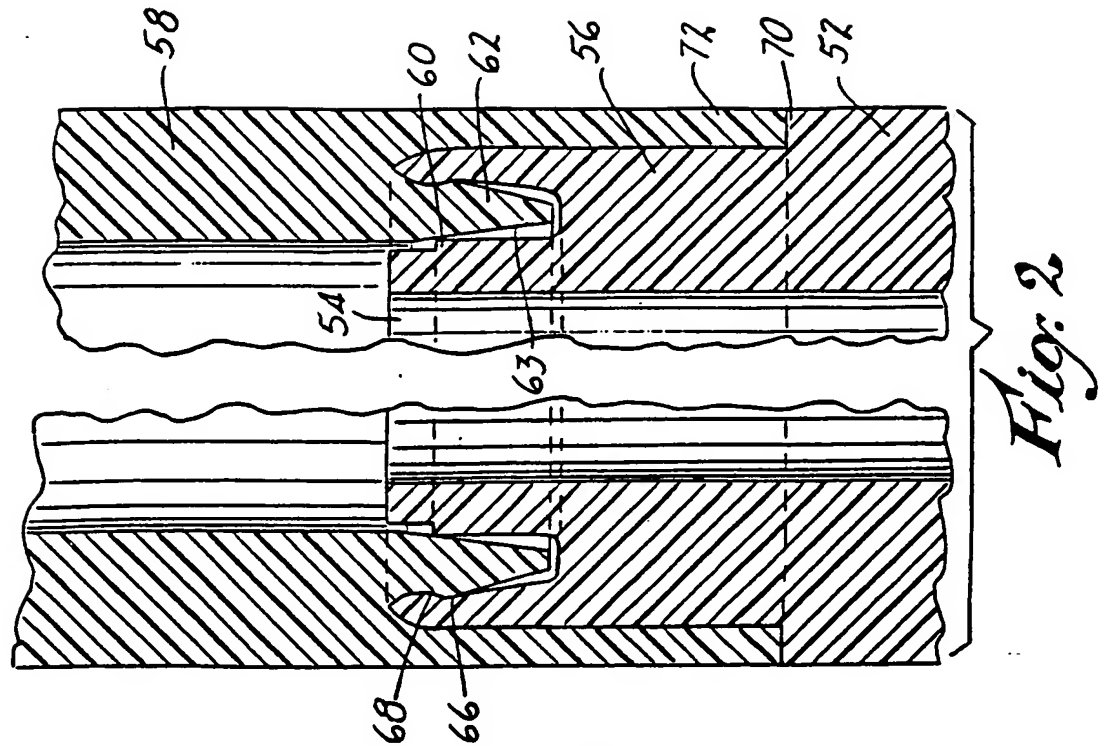
one of said sealing portions comprising a sharp  
10 apex forming an acute included angle,

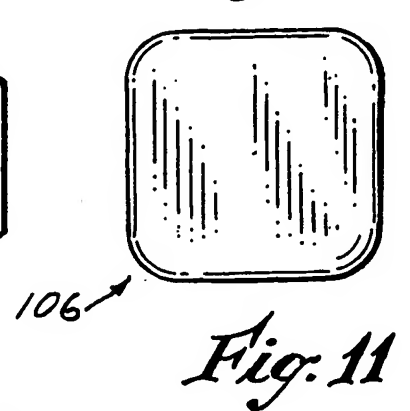
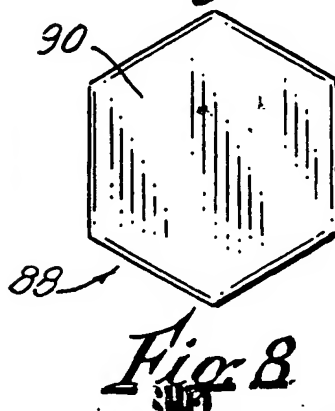
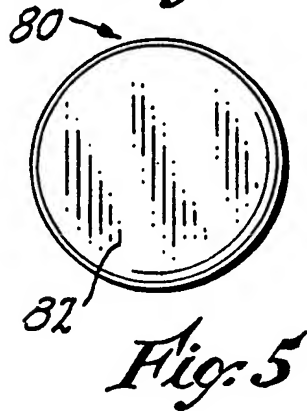
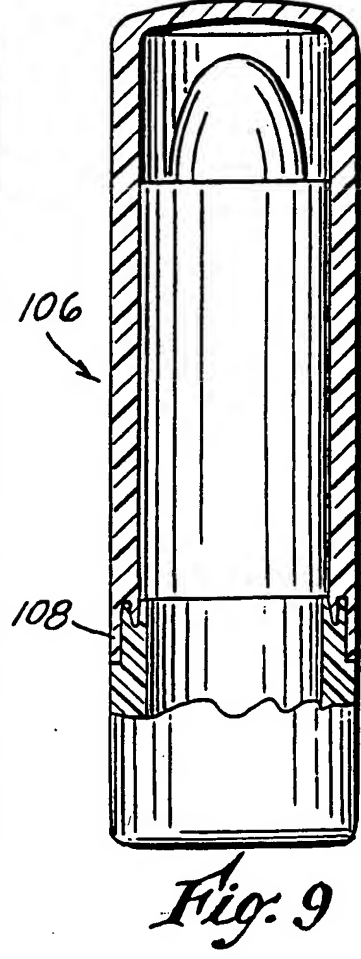
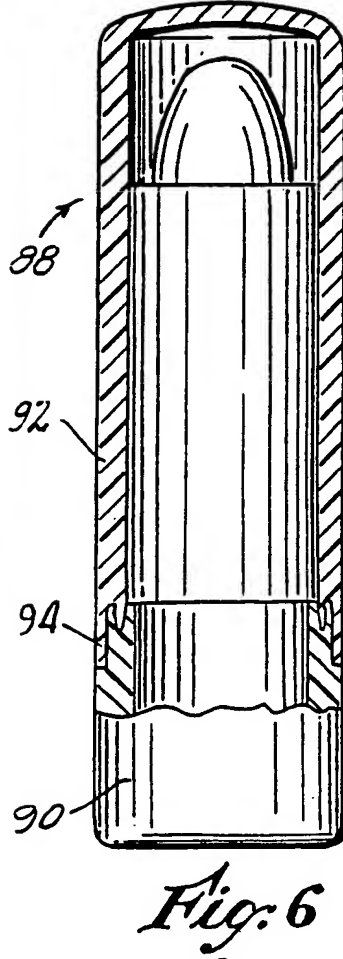
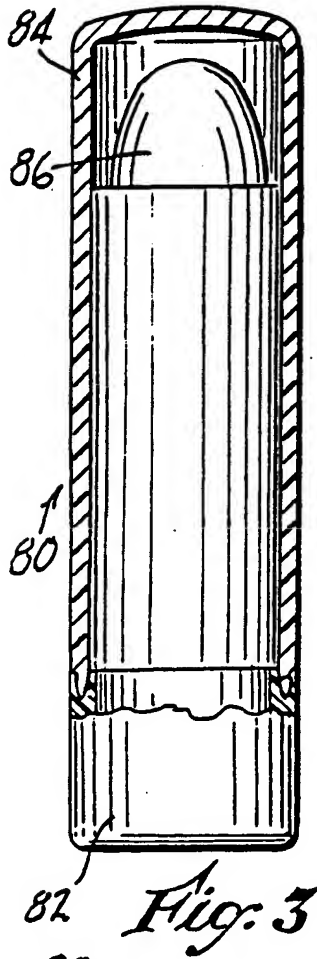
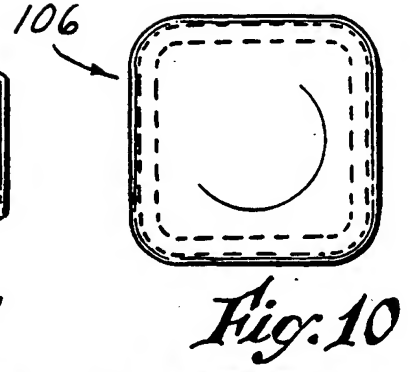
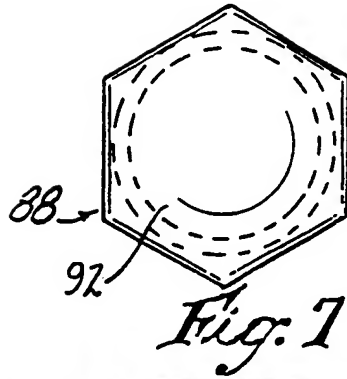
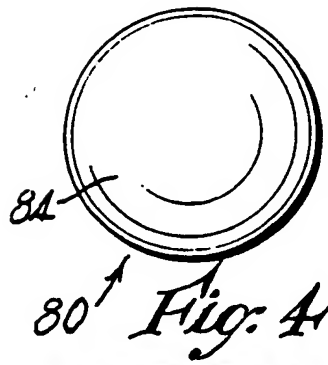
the other of said sealing portions being adapted to engage said apex of said one sealing portion, and coengaging means on said container and closure parts, forcing said sealing portions of the said two  
15 parts forcibly toward each other to bring said apex into sealing engagement with the other of said sealing portions.

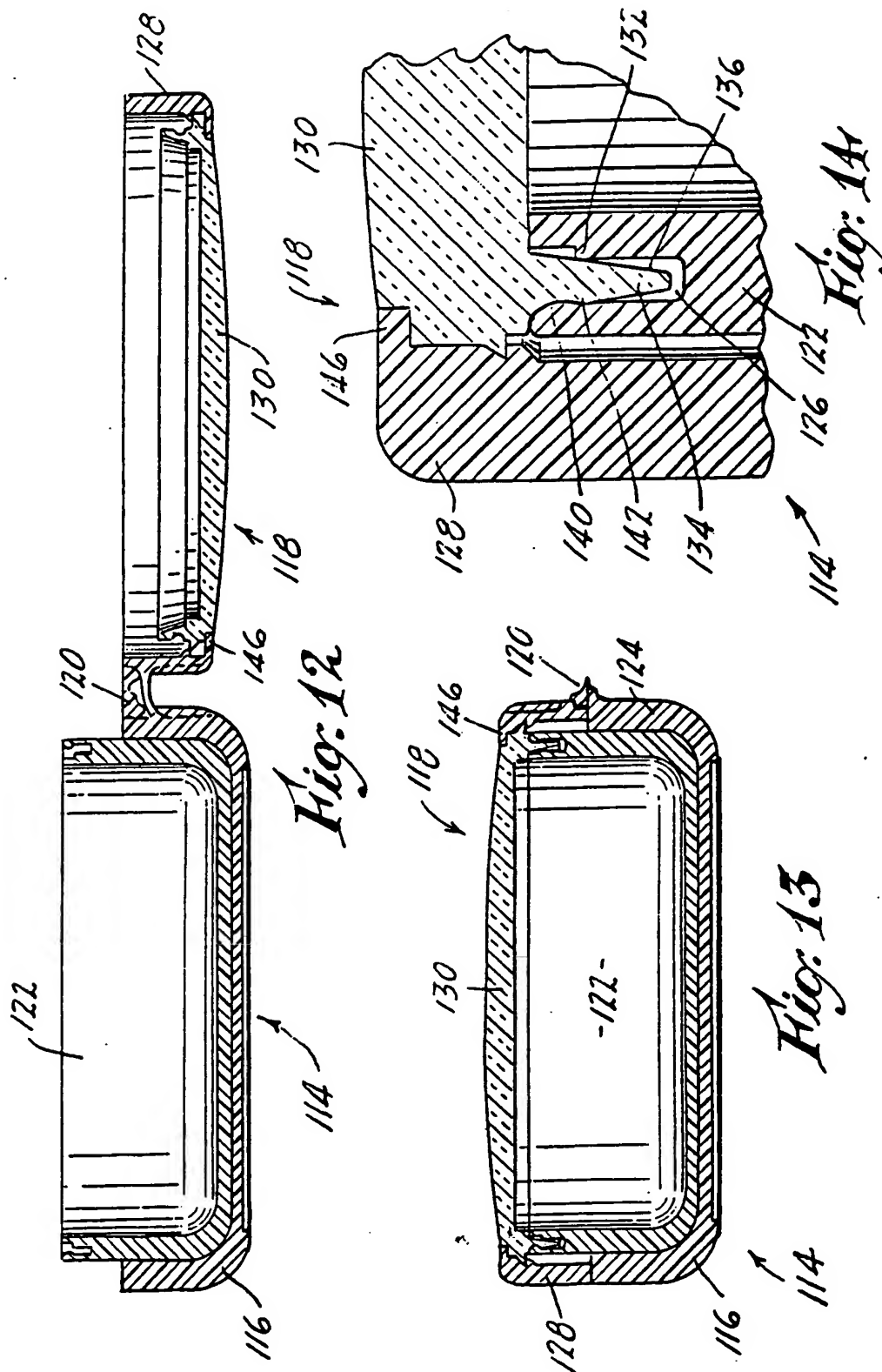
35. A container and sealing closure therefor as set forth in claim 34, wherein said sharp apex is more  
20 resilient than said other sealing portion.

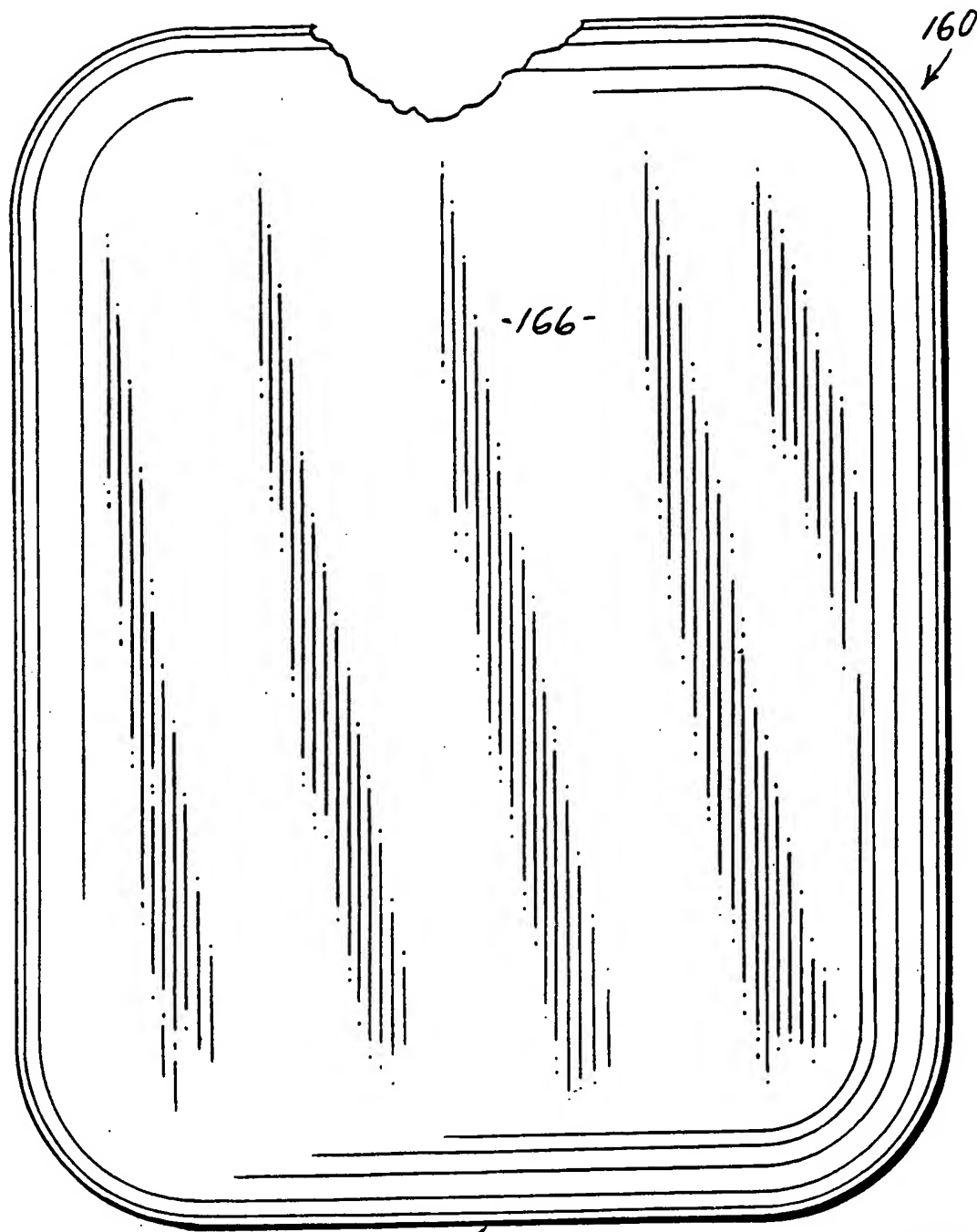
36. A container and sealing closure therefor as set forth in claim 34, wherein said other sealing portion is more resilient than said sharp apex.

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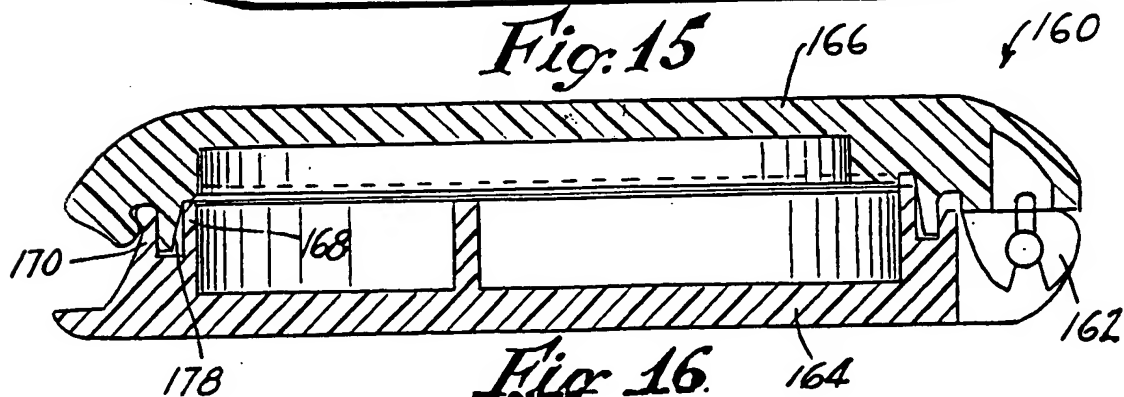




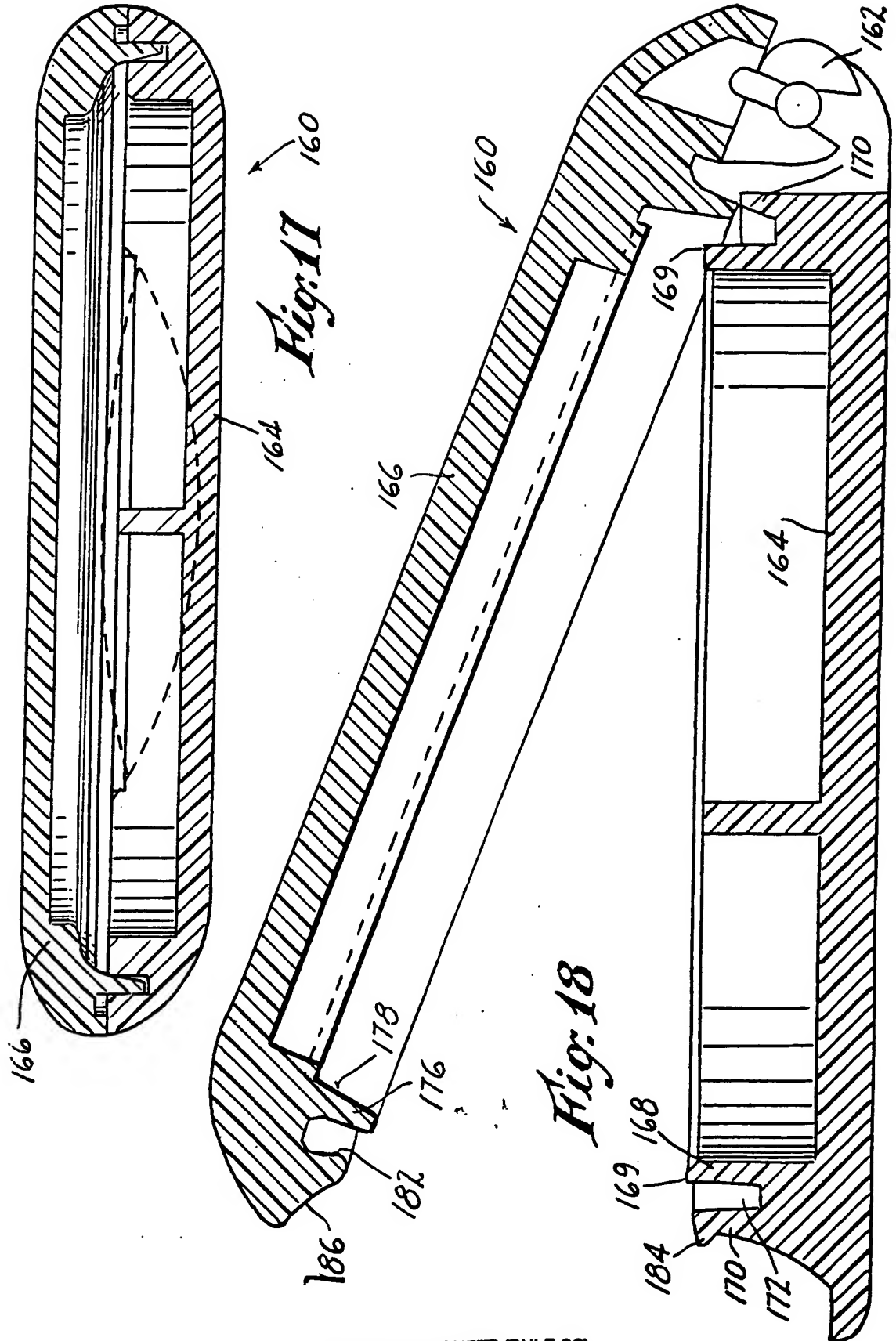




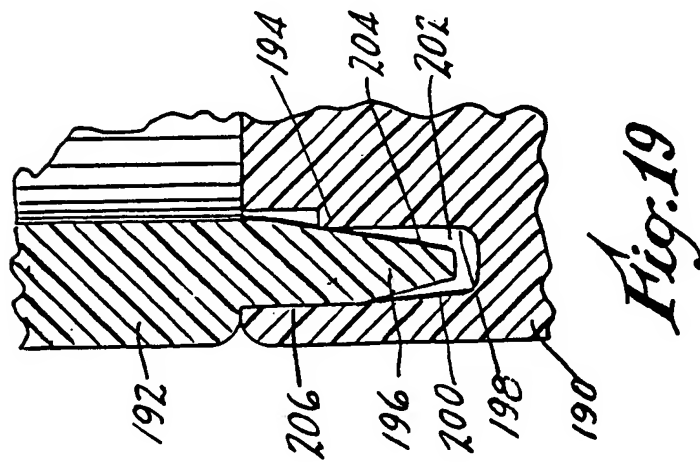
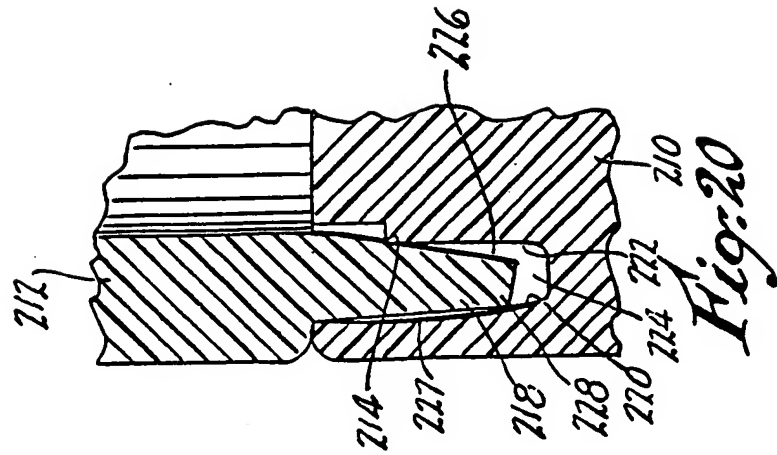
*Fig. 15*



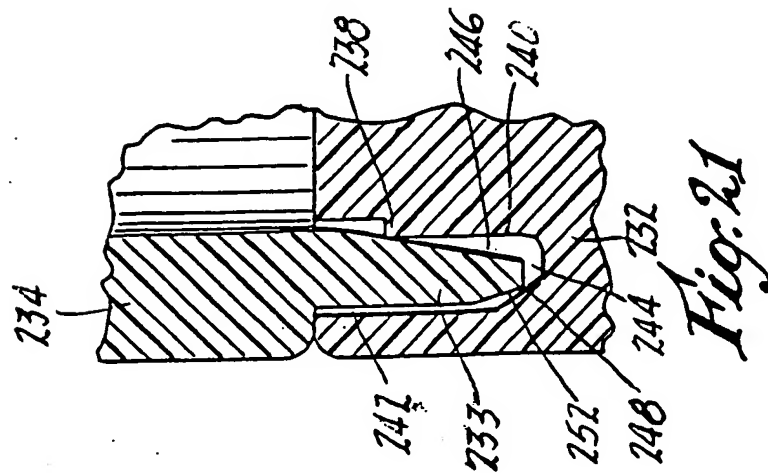
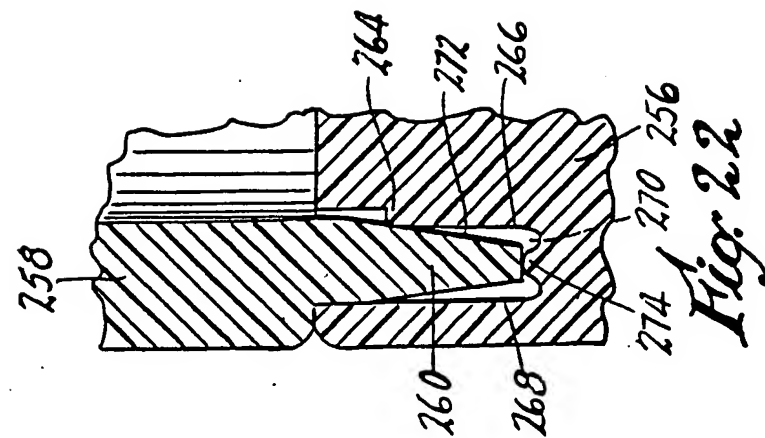
*Fig. 16*

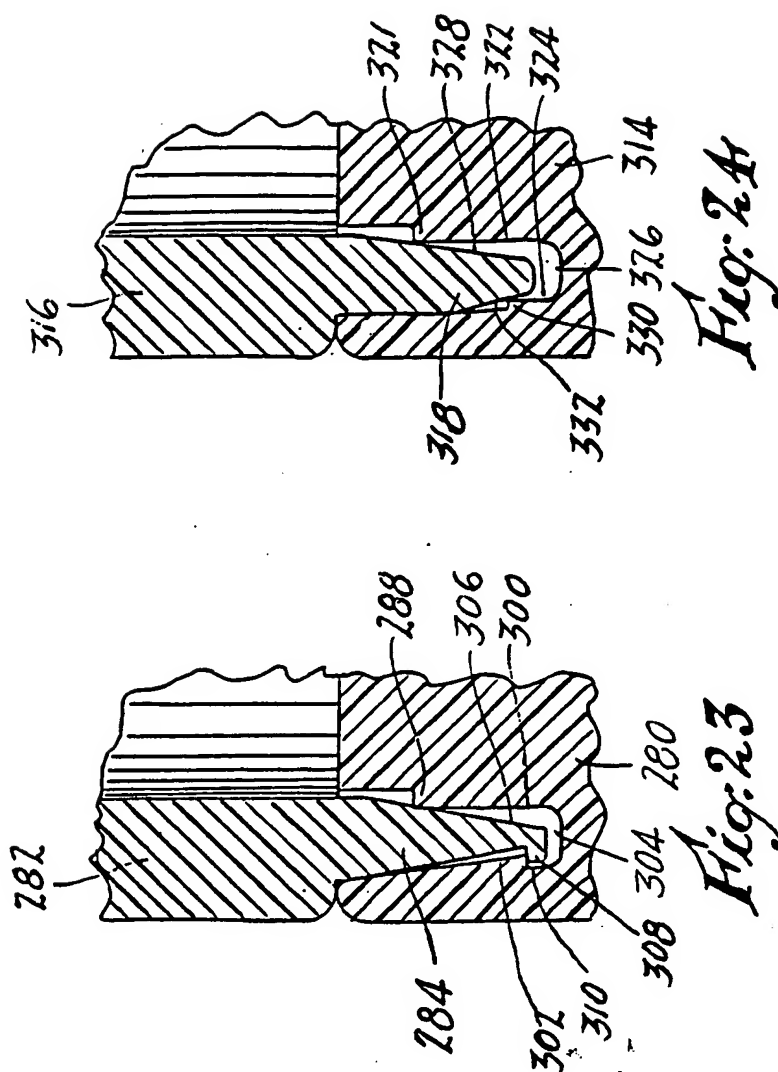


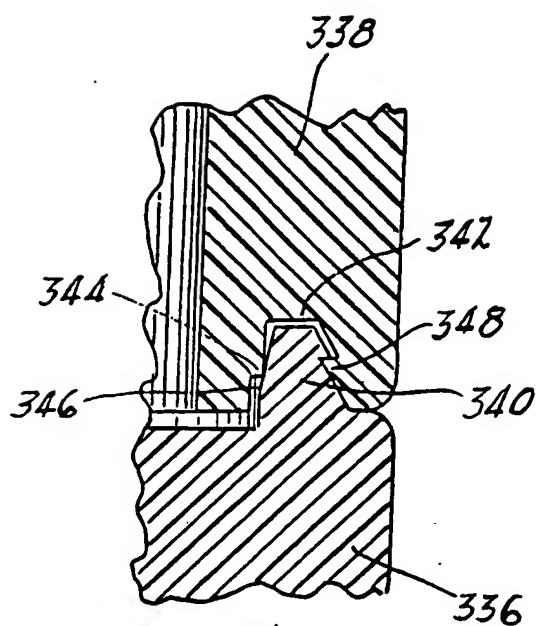
SUBSTITUTE SHEET (RULE 26)











*Fig. 25*

SUBSTITUTE SHEET (RULE 26)

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/03075

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B65D 41/16

US CL :220/783

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 220/783, 4.21, 4.23, 4.24, 4.25, 326, 335, 338, 339, 341, 780, 782, 783, 790, 791, 797, 805

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,708,259 A (OLIMPIO) 24 November 1987, see entire document.	1-9, 11, 13, 19-21, 27, 34-36
A	US 4,801,039 A (MCCALL ET AL.) 31 January 1989, see entire document.	1-36
A	US 3,117,691 A (WILLIAMS) 14 January 1964, see entire document.	1-36
A	US 5,425,469 A (FREEDLAND) 20 June 1995, see entire document.	1-36
A	US 5,205,431 A (ZINNBAUER) 27 April 1993, see entire document.	12, 14-18
A	US 5,531,349 A (WOJCIK ET AL.) 2 July 1996, see entire document.	12, 14-18

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

14 APRIL 1998

Date of mailing of the international search report

05 MAY 1998

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